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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WOLLSCHLAGER, JEFFREY MICHAEL

ART UNIT	PAPER NUMBER
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1732

DATE MAILED: 05/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/692,527

Applicant(s)

JAMALABAD ET AL.

Examiner

Jeff Wollschlager

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-17 and 22-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-17 and 22-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/24/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claims 4-17 and 22-35 are pending in this application.

Information Disclosure Statement

The information disclosure statement filed January 23, 2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the non-patent literature documents referred to therein has not been considered.

Drawings

Figures 12A, B and C and 13A, B, and C should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities. The cross-reference to related applications and the reference to federally sponsored research are missing required information regarding the application number, contract number, and title.

Appropriate correction is required.

Claim Objections

Claim 4 is objected to because of the following informalities: The word "an" is spelled "on" in the claim. Appropriate correction is required.

Claim 6 is objected to because of the following informalities: The word "acts" is recited in the claim. This word appears unnecessary and should be deleted.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 34 and 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 34 recites the limitation "said side wall joins said ceiling". There is insufficient antecedent basis for this limitation in the claim. The claim is interpreted

utilizing the readily understood meaning of the words "ceiling" and "side wall" without the need for them to have been disclosed prior to claim 34.

Claim 35 recites the limitation "said corner piece", "said ceiling" and "said wall". There is insufficient antecedent basis for this limitation in the claim. The terms "corner piece", "ceiling" and "wall" are interpreted utilizing their readily understood meanings without the need for them to have been disclosed prior to claim 35.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 4 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Li (U.S. Patent 3,585,714; issued June 22, 1971).

Regarding claims 4 and 5, Li teaches a method for making an object having at least one surface made from a semiconductor wafer, wherein a plurality of layers are formed such that the inter-layer/between layer regions intersect the surface forming a convex region where the inter-layer regions intersect the surface. Further, the object

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forms concave regions where the intra-layer/within layer regions intersect the surface of the object (Figure 1, Figure 7, col. 3, line 52 – col. 4, line 2; col. 10, lines 21- col. 11, line 5).

Claims 4-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Andre (U.S. Patent 5,976,339; issued November 2, 1999; priority date October 1, 1993).

Regarding claims 4 and 5, Andre teaches a method for making a three-dimensional object utilizing a layered manufacturing technique. Within this method Andre employs incremental layers of mold materials preferably from a droplet-deposition print head and incremental layers of part material (col. 2, lines 63-67). At the end of the layered manufacturing steps, the mold is removed, leaving the finished product (col. 7, lines 61-67).

As acknowledged in the disclosure of the instant application, layered manufacturing methods employing beads/droplets form convex surfaces within the layers (See Figure 3 and Figure 5, elements (92) and (94) in the instant disclosure). Therefore, although Andre does not disclose this fact, it is an inherent property in Andre's method that the mold material (Figure 3A, element 33), applied in bead/droplet form, would form a convex surface within the mold layer.

After forming the first incremental mold layer, Andre forms the first incremental layer of the part material (Figure 3B, element (37); col. 5, lines 56-65). As stated by Andre, this material fills in the space by assuming the dimensions defined by

interruption (35) (col. 5, lines 56-65; Figure 3B). Andre further teaches that this layering process is repeated until the product is formed (col. 7, lines 38-40)

Therefore, the layered product, still contained within the mold, as shown in Figures 3A-3C of Andre's patent are indistinguishable from the layered product, still contained within the mold, shown in Figure 5 of the instant disclosure. Further, once the mold is removed from the product, the product formed by Andre is indistinguishable from the product shown in Figure 6 of the instant disclosure, containing convex inter-layer/between layer regions and concave intra-layer/within layer regions.

As to claim 6, Andre teaches employing flowable materials for both the part layer/first material and the mold layers/second material (col. 5, line 35-col. 6 line 49). Andre exemplifies electroforming nickel, among other substances as the part material and low melting metals or polymers as the mold material.

As to claim 7, the part layer/first flowable material hardens after being applied to the surface.

As to claim 8, the second material/mold layer is ultimately removed from the product (col. 7, lines 62-65).

Regarding claim 9, Andre teaches a method for making an object of a first material having at least one surface comprising the steps: forming a second material layer formed of a second material up to at least one boundary corresponding to the object surface (Figure 3A), forming a first material layer formed of the first material adjacent to the boundary and adjacent to the second material layer, wherein the first material is formed in a flowable state such that the first material forms an impression

along the boundary of the second material layer (Figure 3B and 3C), repeating the steps a plurality of times (col. 7, lines 38-41), and removing the stack of second material layer from the surface of the object (col. 7, lines 62-65).

As to claim 10, the first material employed by Andre is different than the second material used by Andre (col. 5, line 35 – col. 6, line 49). For example, Andre exemplifies electroforming nickel, among other substances as the part material and low melting metals or polymers as the mold material .

As to claim 11, the method of Andre inherently yields an object wherein the second material/mold material forms layers having external convex edges and wherein the first material/product material forms layers having external concave impression adjacent to the convex edges of the second material layer (see the rejection of claims 4 and 5 over Andre above).

As to claim 12, Andre teaches the first and second material forming steps form at least one interior surface and at least one exterior surface (Figure 2, element (21)).

As to claim 13, Andre teaches the second material/mold layer is formed using layered manufacturing techniques such as ink-jet droplet deposition (col 2, lines 62-67). Andre further discloses forming the first material product layer through various layered manufacturing methods, including electroforming (col. 2, lines 62-67), metal droplet formation/jet solidification techniques, and laser engineering techniques (col. 2, lines 7-40). It is noted that although Andre does not exemplify all these methods, he discloses that they are satisfactory for forming the parts (col. 2, lines 13-15).

As to claim 14, Andre teaches that the first material can be formed as one contiguous bead/droplet stream. Inherently the bead/droplet has a diameter and a length (col. 2, lines 8-18).

As to claim 15, Andre teaches a method wherein the first and second layer forming steps include forming a plurality of substantially circular, overlapping material formations (Figure 2, Figure 3E, Figure 4).

As to claim 16, Andre teaches fusing previously deposited material from the first and second layer forming steps (Figure 3C and col. 4, lines 48-55, col. 6, lines 11-19).

As to claim 17, Andre teaches employing flowable materials for both the part layer/first material and the mold layer/second material (col. 5, line 35-col. 6 line 49). Andre exemplifies electroforming nickel, among other substances as the part material and low melting metals or polymers as the mold material.

Claims 22, 26, 34, and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Masters (U.S. Patent 5,216,616; issued June 1, 1993).

Regarding claim 22, Masters teaches a method for making a part of a first material having a cavity with a first volume and a first structure disposed over the cavity (e.g. cantilevered), the method comprising: supporting the first structure during the building of the first structure by building a second structure/web/column of a second material having a second volume within the cavity to support the first structure, building the first structure over the second structure wherein the volume of the second structure

is substantially less than the volume of the cavity volume (Figure 7 and 8, elements (80) and (76); col. 6, lines 35-68).

As to claim 26, the second material forming the second structure/web/column is a different material from the first material (col. 6, lines 66-68).

As to claims 34 and 35, the second structure/web has a corner support piece to support the ceiling from the sidewall and the corner piece is bonded to the ceiling near the corner and to the sidewall. (Figure 8; elements (80-web), (72-ceiling), and (70-sidewall)).

Claims 22, 26, 27, and 33 are rejected under 35 U.S.C. 102(e) as being anticipated by Leyden et al. (U.S. Patent 6,660,209; issued December 9, 2003; priority date September 27, 1995).

Regarding claim 22, Leyden et al. (hereafter Leyden) teach a method for making a part having a cavity with a first volume and a first structure disposed over the cavity (e.g. cantilevered), the method comprising: supporting the first structure during the building of the first structure by building a second structure/supports/branched supports/hybrid supports of a second material having a second volume within the cavity to support the first structure, building the first structure over the second structure wherein the volume of the second structure is substantially less than the volume of the cavity volume (Figures 28a, 28b, where elements (500) and (502) consist of parts of the first structure, and elements (504), (506), (508) consist of parts of the second structure; col. 41 - col. 52 teach many variations on the second structure).

As to claim 26, Leyden teaches the second material is different from the first material (col. 51, lines 10-12).

As to claim 27, Leyden teaches the first structure and the second structure are built by forming layers (col. 42, line 41- col. 42, line 20; Figures 28a, 28b)

As to claim 33, Leyden teaches that the cavity has a floor (Figure 28b, element (500)) and the second structure/supports/branched supports/hybrid supports include building a column having a top and middle portion where the top portion is wider than the middle portion (Figure 28b showing the top of the support structure is wider than the middle which is wider than the bottom).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masters (U.S. Patent 5,216,616; issued June 1, 1993).

As to claims 23-25, Masters teaching the method of claim 22 as discussed in the 102(b) rejection above, but does not expressly teach that the second structure building step forms a second structure whose volume is less than 20, 40, or 50% of the cavity

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volume. However, Masters does teach using a thin web or column (col. 6, lines 63-68) as a second structure and exemplifies the relative size of the column and web in Figures 7 and 8, elements (80) and (76).

Therefore, it would have been *prima facie* obvious to one of ordinary skill in the art to take the teaching of Masters to employ a thin web or column as a second support structure and make the support structure of such a size that its volume would be less than 20% (and in turn less than 40 or 50%) of the cavity volume because one of ordinary skill would be motivated to use as little support material as possible for the purpose of reducing cycle time and reducing production costs. Therefore, the claimed invention as a whole is rendered obvious over the teaching of the prior art.

Claims 23-25 and 28-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leyden et al. (U.S. Patent 6,660,209; issued December 9, 2003; priority date September 27, 1995).

As to claims 23-25, Leyden teaches the method of claim 22 as discussed in the 102(b) rejection above, but does not specifically detail the volume of the cavity filled by the second structure/supports. However, Leyden provides a great deal of teaching regarding the variations available when building the support structures. For example, Leyden teaches that the support structure must be easily removable, that they should be formed using a minimal number of passes and that the building speed should be optimized to increase efficiency (col. 42, line 49 – col. 43 lines 20).

Leyden further teaches that support structures of different dimensions or shapes can be employed (col. 44, lines 8-35). Leyden goes on to teach that variations to the support structures specifically detailed would be obvious to one of ordinary skill based on the requirements of the material being made (col. 45, line 67 – col. 46, line 10; col. 47, lines 34-57). Therefore one of ordinary skill in the art would have to take all of these variables into consideration when determining the volume of the support structure relative to the volume of the cavity. As such, this is a recognized control variable for forming a support structure in layered manufacturing and would have been readily optimized. (See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

As to claims 28-31, Leyden teaches the method of claim 27 as discussed in the 102(b) rejection above, but does not specifically detail the slope of the second structure, or the degree from which the second structure has a side that deviates from vertical. However, Leyden provides a great deal of teaching regarding the variations available when building the support structures. For example, Leyden teaches that the support structure must be easily removable, that they should be formed using a minimal number of passes and that the building speed should be optimized to increase efficiency (col. 42, line 49 – col. 43 lines 20). Leyden also exemplifies sloped support structures (Figure 28b).

Leyden further teaches that support structures of different dimensions or shapes can be employed (col. 44, lines 8-35). Leyden goes on to teach that variations to the support structures specifically detailed would be obvious to one of ordinary skill based on the requirements of the material being made (col. 45, line 67 – col. 46, line 10; col.

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47, lines 34-57). Therefore one of ordinary skill in the art would have to take all of these variables into consideration when determining the slope of the support structure and how far it deviates from a vertical position. As such, this is a recognized control variable for forming a support structure in layered manufacturing and would have been readily optimized. (See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)).

As to claim 32, Leyden teaches the method of claim 27 as discussed in the 102(b) rejection above, but does not specifically teach that a sloping side face/indented layers of the second/support structure is formed of beads indented between $\frac{1}{2}$ a bead width and $\frac{1}{10}$ a bead width. However, Leyden does form a sloping side face of beads/drops and teaches that variations of the support structure can be readily employed by one of ordinary skill (col. 45, line 67 – col. 46, line 10; col. 47, lines 34-57). Further, one of ordinary skill would obviously be motivated to create a support structure that is operative as a support structure. Therefore, it would have been obvious to one of ordinary skill (see Figure 28a and 28b, for example) to not indent the beads forming the layers beyond which the bead is capable of being supported by the layer below it. As such, the claimed invention as a whole is rendered obvious over the combined teaching of the prior art.

Conclusion

All claims are rejected.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Wollschlager whose telephone number is 571-272-8937. The examiner can normally be reached on Monday - Thursday 7:00 - 4:45, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Colaianni can be reached on 571-272-1196. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JW

Jeff Wollschlager
Examiner
Art Unit 1732

May 3, 2006



MICHAEL P. COLAIANNI
SUPERVISORY PATENT EXAMINER